

1 **All Pending Claims:**

2
3 **(in Clear Form, in accordance with 37 CFR §1.121):**

4
5 Please amend claims 1-3, 5, 11, 12, 15, 22, 24, 26, 32-34, 36, and 41 as indicated
6 below:

7
8 1. **(TWICE AMENDED)** An audio watermarking system comprising
9 a pattern generator to generate both a strong watermark and a weak
10 watermark; and
11 a watermark insertion unit to selectively choose insertion of either the
12 strong watermark or the weak watermark into segments of the audio signal.

13
14 2. **(TWICE AMENDED)** An audio watermarking system comprising:
15 a pattern generator to generate both a strong watermark and a weak
16 watermark; and
17 a watermark insertion unit to insert the strong watermark and the weak
18 watermark into the audio signal,
19 wherein the watermark insertion unit selectively inserts either the strong
20 watermark or the weak watermark into segments of the signal according to an
21 audible measure of the segments.

22
23 3. **(TWICE AMENDED)** An audio watermarking system comprising:
24 a pattern generator to generate both a strong watermark and a weak
25 watermark;

1 a watermark insertion unit to insert the strong watermark and the weak
2 watermark into the audio signal;

3 a processor to determine a hearing threshold for the audio signal; and

4 the watermark insertion unit inserts the strong watermark when the signal
5 exceeds the hearing threshold and inserts the weak watermark when the signal
6 falls below the hearing threshold.

7
8 4. An operating system comprising an audio watermarking system as
9 recited in claim 1.

10
11 5. (AMENDED) An audio watermark encoding system comprising:

12 a converter to convert an audio signal into magnitude and phase
13 components;

14 a mask processor to determine a hearing threshold for corresponding
15 magnitude components;

16 a pattern generator to generate both a strong watermark and a weak
17 watermark; and

18 a watermark insertion unit to selectively insert one of either the strong
19 watermark or the weak watermark into the audio signal based on whether the
20 magnitude components exceed or fall below the hearing threshold.

21
22 6. An audio watermark encoding system as recited in claim 5, wherein
23 the watermark insertion unit inserts the strong watermark when the magnitude
24 component exceeds the hearing threshold and inserts the weak watermark when
25 the magnitude component falls below the hearing threshold.

1
2 7. An audio watermark encoding system as recited in claim 5, wherein
3 the watermark insertion unit inserts the strong watermark when the magnitude
4 component exceeds the hearing threshold by a predetermined amount and inserts
5 the weak watermark when the magnitude component falls below the hearing
6 threshold by the predetermined amount.

7
8 8. An audio watermark encoding system as recited in claim 7, wherein
9 the watermark insertion unit foregoes inserting the strong watermark or the weak
10 watermark when the magnitude component lies within the predetermined amount
11 above and below the hearing threshold.

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13 9. An audio encoding system comprising:
14 an audio watermark encoding system as recited in claim 5; and
15 a compression unit, wherein the compression unit and the audio watermark
16 encoding system both utilize the magnitude components.

17
18 10. An operating system comprising an audio watermark encoding
19 system as recited in claim 5.

20
21 11. **(AMENDED)** A watermark insertion unit, comprising:
22 an input to receive frequency magnitude components of an audio signal,
23 hearing thresholds derived from the magnitude components, strong watermark
24 values, and weak watermark values; and
25

1 multiple insertion operators for selectively combining the magnitude
2 components and one of either the strong watermark values or the weak watermark
3 values depending upon whether the magnitude components exceed or fall below
4 the hearing thresholds.

5
6 12. (AMENDED) An audio watermark detection system, comprising:
7 an input module to receive a watermarked audio signal;
8 a synchronization module to determine which portion of the watermarked
9 audio signal might contain a watermark; and
10 a correlation module to detect whether either a strong watermark or a weak
11 watermark is present in the portion of the watermarked audio signal.

12
13 13. An audio watermark detection system as recited in claim 12, wherein
14 the correlation module computes a correlation value from the watermarked audio
15 signal and the strong watermark that tends toward a first value when the strong
16 watermark is present and a second value when the strong watermark is not present.

17
18 14. An audio watermark detection system as recited in claim 12, wherein
19 the correlation module computes a correlation value from the watermarked audio
20 signal and the weak watermark that tends toward a first value when the weak
21 watermark is present and a second value when the weak watermark is not present.

22
23 15. (AMENDED) An audio watermark detection system as recited in
24 claim 12, wherein the correlation module computes a correlation value from the
25 watermarked audio signal and one of either the strong watermark or the weak

1 watermark, the correlation module determining that said one strong watermark or
2 weak watermark is present when the correlation value exceeds a predetermined
3 threshold plus a random amount.

4
5 16. An operating system comprising an audio watermark detection
6 system as recited in claim 12.

7
8 17. An audio watermark detection system comprising:
9 a converter to convert a watermarked audio signal into magnitude and
10 phase components;
11 a mask processor to determine a hearing threshold for corresponding
12 magnitude components;
13 a pattern generator to generate both a strong watermark and a weak
14 watermark; and
15 a watermark detector to detect presence of the strong watermark and the
16 weak watermark in the audio signal.

17
18 18. An audio watermark detection system as recited in claim 17, wherein
19 the watermark detector computes correlation values from the watermarked audio
20 signal and each of the strong watermark and the weak watermark and detects the
21 presence of the strong watermark and the weak watermark based on whether the
22 correlation values exceed a predetermined threshold.

23
24 19. An audio watermark detection system as recited in claim 17, further
25 comprising:

1 a random operator for generating a random value; and
2 the watermark detector computes correlation values from the watermarked
3 audio signal and each of the strong watermark and the weak watermark and
4 detects the presence of the strong watermark and the weak watermark based on
5 whether the correlation values exceed a predetermined threshold plus the random
6 value.

7
8 20. An audio decoding system comprising:
9 an audio watermark detection system as recited in claim 17; and
10 a decompression unit, wherein the decompression unit and the audio
11 watermark detection system both utilize the magnitude components.

12
13 21. An operating system comprising an audio watermark detection
14 system as recited in claim 17.

15
16 22. **(TWICE AMENDED)** An audio watermarking architecture,
17 comprising:

18 a watermark encoding system to selectively choose insertion of either a
19 strong watermark or a weak watermark into segments of an audio signal; and
20 a watermark detecting system to detect a presence of either the strong
21 watermark or the weak watermark in the segments of the audio signal.

22
23 23. An audio watermarking architecture as recited in claim 22, wherein
24 the watermark encoding system resides at a content producer to watermark
25

1 original audio content and the watermark detecting system resides at one or more
2 clients to detect the watermarks and play the original audio content.

3
4 24. (AMENDED) An audio watermarking architecture as recited in
5 claim 22, wherein the watermark encoding system comprises:

6 a converter to convert the audio signal into magnitude and phase
7 components;

8 a mask processor to determine a hearing threshold for corresponding
9 magnitude components;

10 a pattern generator to generate both the strong watermark and the weak
11 watermark; and

12 a watermark insertion unit to selectively insert one of either the strong
13 watermark or the weak watermark into the audio signal based on whether the
14 magnitude components exceed or fall below the hearing threshold.

15
16 25. An audio watermarking architecture as recited in claim 22, wherein
17 the watermark detecting system comprises:

18 a converter to convert a watermarked audio signal into magnitude and
19 phase components;

20 a mask processor to determine a hearing threshold for corresponding
21 magnitude components;

22 a pattern generator to generate both a strong watermark and a weak
23 watermark; and

24 a watermark detector to detect presence of the strong watermark and the
25 weak watermark in the audio signal.

1
2 26. (TWICE AMENDED) A method for watermarking an audio signal,
3 comprising:

4 watermarking a first portion of the audio signal with a strong watermark;
5 and
6 watermarking a second portion of the audio signal with a weak watermark,
7 wherein the first and second portions are separate.

8
9 27. A method for watermarking an audio signal, comprising:
10 comparing samples of the audio signal to a hearing threshold;
11 watermarking samples exceeding the hearing threshold with a strong
12 watermark; and

13 watermarking samples falling below the hearing threshold with a weak
14 watermark.

15
16 28. A method as recited in claim 27, wherein the watermarking samples
17 comprises:

18 watermarking samples exceeding the hearing threshold plus a buffer value
19 with a strong watermark;

20 watermarking samples falling below the hearing threshold by less than the
21 buffer value a with a weak watermark; and

22 leaving samples lying within the buffer value above and below the hearing
23 threshold without a watermark.
24
25

1 29. A method as recited in claim 27, further comprising detecting the
2 strong watermark and the weak watermark in the audio signal.

3
4 30. A method as recited in claim 29, wherein the detecting comprises
5 computing a correlation value from the audio signal and the strong watermark, the
6 correlation value tending toward a first value when the strong watermark is present
7 and a second value when the strong watermark is not present.

8
9 31. A method as recited in claim 29, wherein the detecting comprises
10 computing a correlation value from the audio signal and the weak watermark, the
11 correlation value tending toward a first value when the weak watermark is present
12 and a second value when the weak watermark is not present.

13
14 32. **(AMENDED)** A method as recited in claim 27, further comprising:
15 computing a correlation value from the audio signal and one of either the
16 strong watermark or the weak watermark; and
17 determining that either said one strong watermark or said one weak
18 watermark is present when the correlation value exceeds a predetermined
19 threshold plus a random amount.

20
21 33. **(TWICE AMENDED)** A method comprising:
22 selectively encoding portions of an audio signal with either a strong
23 watermark or a weak watermark; and
24 detecting a presence of the strong watermark and the weak watermark in
25 the audio signal.

1
2 34. **(TWICE AMENDED)** A computer readable medium having
3 computer executable instructions for:

4 watermarking a first portion of an audio signal with a strong watermark;
5 and

6 watermarking a second portion of the audio signal with a weak watermark,
7 wherein the first and second portions are separate.
8

9 35. A computer readable medium having computer executable
10 instructions for:

11 comparing samples of an audio signal to a hearing threshold;

12 watermarking samples exceeding the hearing threshold with a strong
13 watermark; and

14 watermarking samples falling below the hearing threshold with a weak
15 watermark.
16

17 36. **(AMENDED)** An audio watermarking system comprising:

18 a pattern generator to generate both a strong watermark and a weak
19 watermark; and

20 a watermark insertion unit to insert the strong watermark and the weak
21 watermark into the audio signal,

22 wherein the watermark insertion unit selectively choose insertion of either
23 the strong watermark or the weak watermark into segments of the signal according
24 to an audible measure of the segments.
25

1 37. An audio watermarking system comprising:
2 a pattern generator to generate both a strong watermark and a weak
3 watermark; and
4 a watermark insertion unit to insert of the strong watermark into one or
5 more first segments of the audio signal and to insert of the weak watermark into
6 one or more second segments of the audio signal, wherein the first and second
7 segments are distinguishable.

8
9 38. An audio watermarking system as recited in claim 37, wherein the
10 watermark insertion unit selectively chooses segments for insertion of the
11 watermarks according to an audible measure of the segments.

12
13 39. An audio watermarking system as recited in claim 37, wherein the
14 watermark insertion unit selectively chooses segments for insertion of the strong
15 watermark according to an audible measure of the segments.

16
17 40. An audio watermarking system as recited in claim 37, wherein the
18 watermark insertion unit selectively chooses segments for insertion of the weak
19 watermark according to an audible measure of the segments.

20
21 41. **(AMENDED)** An audio watermarking system as recited in claim 37,
22 further comprising:
23 a processor to determine a hearing threshold for segments of the audio
24 signal; and
25

1 the watermark insertion unit inserts the strong watermark into a segment
2 when the signal of that segment exceeds the hearing threshold and inserts the weak
3 watermark into a segment when the signal of that segment falls below the hearing
4 threshold.

5
6 42. An operating system comprising an audio watermarking system as
7 recited in claim 37.